Memorandum Describing Final Approved Modifications to Rocky Flats Cleanup Agreement Attachments

1.0 Introduction - Proposed modifications to certain Rocky Flats Cleanup Agreement (RFCA) Attachments were released for public review and comment by the RFCA Parties, the Department of Energy (DOE), the Environmental Protection Agency (EPA) and the Colorado Department of Pubic Health and Environment (CDPHE), on November 12, 2002 (hereinafter, the "proposal"). A *Technical Basis Document for the Proposed Modifications* was released at the same time to explain the rationale and basis for the proposal to facilitate public review. Ninety-five sets of individual or organization comments were received. After consideration of public comments received and incorporation of changes deemed necessary for approval, EPA and CDPHE have approved final modifications as described herein.

The proposal incorporated new surface Radionuclide Soil Action Levels (RSALs) for plutonium, americium and uranium that are more conservative than the RSALs established in 1996. New soil action levels for other contaminants of concern at the Site, most of which are more conservative than the 1996 action levels, and new action levels for ecological receptors were also proposed. The proposal recognized that a wildlife refuge is the reasonably foreseeable future land use of the Site. The new RSALs and action levels for other soil contaminants of concern were proposed based on contamination levels that are calculated to pose a lifetime excess cancer risk of $1x10^{-5}$ to a wildlife refuge worker. This is the midpoint of the acceptable lifetime excess cancer risk range promulgated pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and complies with the anticipated relevant and appropriate requirements for radiation dose limits for a refuge worker as well as for a hypothetical rural resident.

The new RSALs in the proposal and the soil action level changes for other contaminants were predicated upon the adoption of an integrated risk-based approach for surface and subsurface contamination. This approach requires removal of soils contaminated above the RSALs or non-radionuclide contaminant action levels to specified depths and the application of a risk screen methodology to contaminated soils below that depth. The risk screen considers pathways of exposure that may pose a lifetime excess cancer risk of $1x10^{-5}$ or greater to a wildlife refuge worker. In response to the strong community priority for removal of soils with plutonium-239/240 and americium-241, which are subject to wind and water erosion and present a direct exposure path, the RFCA Parties proposed that soils above the RSALs for plutonium and americium be removed down to 3 feet below the surface. Removal of soils between 3 and 6 feet below the surface was also proposed for plutonium-239/240 concentrations above 3 nCi/g, depending upon the areal extent and volume of contamination that would pose an unacceptable risk if it were brought to the surface by burrowing animals. A new Attachment 14 specifying targeted soil sampling between 3 and 6 feet associated with Original Process Waste Line reported

or suspected leak locations was also proposed. The proposal specified removal of soils with other contaminants of concern above their respective action levels down to 6 inches below the surface. Below these removal depths the risk screen is applied.

The proposal included a change to the ground water action level for tritium and a change to the averaging period for measurement of plutonium and americium in surface water at the three onsite Points of Compliance (POCs) at the outfalls of the terminal ponds A-4, B-5 and C-2.

2.0 Purpose and Format - The purpose of this memorandum is to describe the changes incorporated in the final approved modifications.

Section 3.0 of this Memorandum discusses the final approved modifications and changes made from the proposal in the following Documents:

- RFCA Attachment 5, *Action Levels and Standards Framework for Surface Water, Ground Water and Soils*;
- RFCA Attachment 10, *RCRA Closure for Interim Status Units*; and
- new RFCA Attachment 14, *Original Process Waste Lines (OPWL) Subsurface Soil Approach*.

A *Response to Comments* has been prepared to document the RFCA Parties' consideration of the comments received regarding the proposal. While Section 3.0 briefly discusses the comments in relation to changes made in the final modifications, please refer to the *Response to Comments* for specific comments and responses.

3.0 Final Approved Modifications and Changes from Proposed Modifications Released November 12, 2002

3.1 Attachment 5, *The Action Levels and Standards Framework for Surface Water, Ground Water and Soils* - The following is a section-by-section guide to the major changes.

3.1.1 Section 1.0, General Background – After consideration of comments related to the future land use scenario, soil put back levels, institutional controls and long-term stewardship the proposal was adopted without change. In Section 1.1 one reasonably anticipated future land use - a wildlife refuge – replaces the former five conceptual land uses for various portions of the Site. Proposed changes related to "put-back levels" were retained because this may facilitate decisions to remove small volumes of soil with higher concentrations of contamination that are overlain by large volumes of less contaminated soil that otherwise would not trigger removal under the requirements of Attachment 5.

Section 1.2 modifications recognizing that appropriate institutional controls and long-term stewardship activities will be employed at the Site are also retained essentially as proposed. Numerous comments were received related to the post-closure regulatory approach for enforcement and the funding aspects of long-term stewardship. While the

RFCA Parties understand that these issues will require further consultation and discussion, including consultation with the community, they do not need to be resolved as part of these modifications. DOE will continue to consult with the community on the development of its Long Term Stewardship plan and these issues will also be addressed as appropriate in the development of the RCRA Facility Investigation/Remedial Investigation - Feasibility Study/ Corrective Measures Study (RFI/RI-CMS/FS), the Proposed Plan and the final Corrective Action Decision/Record of Decision (CAD/ROD).

Comments also were received related to adoption of a degree of cleanup that would eliminate the need for institutional controls and certain long-term stewardship activities. The RFCA Parties do not believe that it is feasible to achieve such a degree of cleanup for a variety of reasons, including cost and limitations of current technology.

Figure 1, *Conceptual Land Uses at RFETS* indicates areas of the Rocky Flats Environmental Technology Site (RFETS or the Site) within which it is anticipated that institutional controls will be used to prevent unacceptable exposure from residual contamination to the wildlife refuge worker. In addition it is presumed that there will be no residential development at the Site. Figure 1 also shows areas of the Site where landslide or increased erosion potential exists. Although no comments were received related to these aspects of the proposal Figure 1, minor changes to clarify certain mapped features and the legend were made in the final modification.

3.1.2 Section 2.0, Surface Water – Section 2.1 is unchanged from the proposal. The new Figure 2, Sketch of Stream Segments 4a/4b and 5, which accompanies the narrative description in Section 2.1, is also adopted, but minor changes were made to Figure 2's key in the final modification to more clearly indicate the segments. No comments related to the proposal were received.

Several comments were received regarding the proposed elimination of the point of compliance monitoring for tritium in section 2.2.C.1. The final modification adopts the proposed change. The proposed Section 2.2.C.2 modification adding a description of the Point of Evaluation (POE) at the outfall of the sewage treatment plant, as agreed in relation to the renewal of the discharge permit is also unchanged.

CDPHE has notified the Water Quality Control Commission of the proposal to change to an annual averaging period for plutonium and americium for the on-Site POCs in Sections 2.2.C.4 and 2.3, but the change is contingent upon adoption by the Commission, which is expected to occur in 2004. A number of comments were received regarding this proposed change, and the majority of these suggested that various reporting, notification and record keeping requirements be imposed. Many of these suggestions may ultimately be adopted in consultation with the community, but they do not affect the averaging period to be used for regulatory compliance determinations. A number of comments were received questioning why only plutonium and americium are specified as contaminants for monitoring. This specificity does not preclude monitoring for other contaminants of concern, but rather is intended to incorporate an annual averaging period for plutonium and americium. Therefore the proposal is adopted.

A number of comments were received regarding Section 2.2.C.5 and Section 2.3 in the proposal to clarify that specific surface water performance monitoring points may be implemented in addition to identified POEs or POCs. The comments suggested various requirements be added to expand the number of POCs and other monitoring points and the contaminants to be monitored. The proposal did not preclude consideration of these suggested requirements in decision documents or the Integrated Monitoring Plan (IMP) as appropriate. Since this was intended as a clarification related to performance monitoring points the proposal is adopted.

While not included in the proposal, the RFCA Parties have agreed that Table 1, *Surface Water Action Levels and Standards* should be updated to reflect the classifications and standards approved by the Water Quality Control Commission effective October 20, 2001. The WQCC consideration and promulgation of these changes is conducted pursuant to a formal public participation process. An annotated Table 1 showing the specific changes is enclosed with this memorandum.

3.1.3 Section 3.0, Ground Water – In the proposal Section 3.2.B.4 eliminated Table 3, *Tier II Ground Water Wells*. This Table is no longer needed since these well locations are identified in the IMP. The IMP is reviewed and updated as needed on an annual basis. (In the final modifications, Table 3 is now titled, *Soil Action Levels*.)

Table 2, *Ground Water Action Levels* changed the Tier II action level for tritium from 666 to 20,000 pCi/l and the Tier I action level (100 times the Tier II action level) from 66,600 to 2,000,000 pCi/l in the proposal. This change makes the Tier II action level consistent with the promulgated Maximum Concentration Limit (MCL) for tritium in drinking water. Measurable tritium is found in groundwater samples very infrequently, but at low levels compared to the Tier II action level. No comments were received regarding this action level change and it is adopted.

3.1.4 Section 4.0, Soils Contaminated with Non-Radioactive Materials – The title was changed from the proposal, Non-Radionuclide Contaminated Soils, for clarity.

The proposal was a complete rewrite of the original Section 4.0, Subsurface Soils, because the basis for accelerated action determinations in soil is based on risk posed by contamination rather than on a definition of surface and subsurface soils.

The majority of comments received focused on concerns about the underlying policy aspects of the proposed new integrated risk based approach. Although these concerns were directed towards the approach for plutonium, americium and uranium contamination, which is governed by Section 5.0, Soils Contaminated with Radioactive Material, the RFCA Parties assumed the issues raised were intended to apply to Section 4.0, as well. Many questioned the RFCA Parties policy decision to "fund" the additional soil removal triggered by the lower RSAL with closure project contract baseline savings projected to result from the application of the risk screen methodology. (Lower baseline costs for subsurface soil removal are projected, because there are insignificant or

incomplete pathways of exposure to a wildlife refuge worker or to ecological resources from subsurface contamination. Thus, the risk posed by subsurface contamination at many Individual Hazardous Substance Sites is expected to be less than $1x10^{-5}$ and an accelerated action to remove the soil would not be triggered.)

Some questioned adopting soil action levels based upon a $1x10^{-5}$ risk rather than a $1x10^{-6}$ risk or some lower value. Some commenters thought the integrated risk based approach should not be constrained by current projected closure project funding levels, and also expressed concern that comparison of cost projections for the current baseline and the integrated risk based approach were not well documented.

Many commenters expressed concerns about the institutional controls and long-term stewardship implications resulting from subsurface contamination that would not be removed under the risk screen approach. Some commenters had concerns about various technical details and aspects of the approach that were based on information in the *Technical Basis Document* and not the implementing language in Sections 4.0 and 5.0. In particular, there were a number of questions and suggestions regarding the prairie dog model used to estimate possible intrusion into and mobilization of subsurface contamination. While these were primarily focused on radionuclide contamination, they also related to non-radioactive contaminants.

The RFCA Parties considered the comments related to all of these issues. The final modifications in Section 4.0, Table 3 and Figure 3 retain the key elements of the integrated risk based approach that were in the proposal. However, the final modification contains a number of editorial and other changes to provide additional clarity.

Figure 3 has been renamed the *Subsurface Soil Risk Screen* rather than the *Soil Risk Screen* since the screen is only applied after any soil removals triggered by contamination above the action levels will be done. The decision gates have also been revised for clarity. The proposed Screen 6 related to soils that may cause surface water standards to be exceeded at an existing Point of Compliance has been eliminated. Screen 4 has been changed to incorporate evaluation of impacts to surface water, without the limitation in the proposed Screen 6. A conforming change was made to Section 4.2D to reference the entire Section 2.0 in Attachment 5, rather than just Section 2.4 for evaluations related to surface water impacts.

Section 4.2.I now also specifies that if the Subsurface Soil Risk Screen evaluation results in the determination that no accelerated action is triggered, the evaluation and results will be documented and approved by the Lead Regulatory Agency as a No Further Accelerated Action.

Table 3 has been changed from the proposal to eliminate the separation of site wide contaminants of concern as a separate part and a notation now indicates these contaminants within the table. The proposal listed ecological receptor action levels in Table 3 for analytes where the ecological receptor action level was lower than the wildlife refuge worker action level. All ecological receptor action levels that have been

calculated to date are listed in the final Table 3. Twelve new analytes have been added to the final Table 3 from EPA's list of Persistent, Bioaccumulative and Toxic (PBT) pollutants. The RFCA Parties are reviewing these analytes to determine if they were or could have been used at RFETS and whether the analyte is an ecological potential contaminant of concern. These analytes do not include action levels at this time; however, in the location of a value are the letters "TBD." If it is determined that any new analyte that was used or could have been used at RFETS is a potential contaminant of concern, then an action level will be determined in the same manner used to calculate the action levels in Table 3. (Note: This would include a calculation of wildlife refuge worker action levels as well as ecological receptor action levels.) Table 3 will be modified, if needed, based upon the outcome of this evaluation and after public review and comment.

Footnote b has been changed in the final Table 3 to clarify that all other analytes without calculated ecological receptor action levels will be evaluated to determine whether any are ecological potential contaminants of concern. These will be considered in any Action Determination, including pursuant to the Subsurface Soil Risk Screen, Screen 5 for an IHSS where these contaminants are located. An ecological receptor action level will be determined in the same manner used to calculate the other ecological receptor action levels in the table. Table 3 will be modified, if needed, based upon the outcome of this evaluation and after public review and comment.

3.1.5 Section 5.0, Soils Contaminated with Radioactive Material – As with Section 4.0, in the proposal this was a complete rewrite. The provisions of this section essentially parallel those in Section 4.0 regarding the application of the soil risk screen methodology for subsurface soils.

The majority of public comments were related to concerns about aspects of plutonium and americium accelerated action determinations and cleanup of soil once an action is triggered. While commenters expressed agreement with lowering the RSAL and the removal of soils above the plutonium and americium RSAL to 3 feet below the surface, many requested that the plutonium-239/240 RSAL be lowered to account for the possibility of a future subsistence farmer land use scenario. Some questioned adopting soil action levels based upon a $1x10^{-5}$ risk rather than a $1x10^{-6}$ risk or some lower value. Many objected to limiting the proposed approach to constraints of projected closure project funding and requested that DOE work to obtain additional funding to remove more plutonium contaminated soil. Others objected to the 10 nCi/g and 3 nCi/g limits for removal of soils in the 3-6 foot depth and requested removal of plutonium-239/240 contamination to 1 nCi/g or lower and to deeper levels regardless of depth or cost. Some requested more specificity about consultation with the community if extensive contamination between 1 and 3 nCi/g is encountered. Other concerns included the subsurface soil depths at which the risk screen will be applied for plutonium, americium or uranium, and the removal of soil above the RSAL down to 3 feet only if the contamination originated at the surface.

Many commenters expressed concerns about the institutional controls and long-term stewardship implications resulting from subsurface radionuclide contamination that would not be removed under the risk screen approach. Again, the questions and suggestions regarding the prairie dog model in the *Technical Basis Document* were primarily focused on radionuclide contamination.

While the RFCA Parties have determined that most attributes of the proposal will be retained in the final modification, the community preference for removal of plutonium-239/240 contamination to below 1 nCi/g is adopted for accelerated actions triggered in the 3 to 6 foot depth interval. The concentrations that will trigger accelerated actions to remove contaminated soils in the 3-6 foot depth interval have been changed as outlined in the following table:

Contamination Level (nCi/g)	Areal Extent Limit (m^2)	Volume Extent Limit (m^3)
7	0	0
6	40	25
5	50	31
4	60	37
3	80	50

In addition, the proposal requirement that plutonium or americium contamination in the 0-3 foot depth interval must originate on the surface to trigger an accelerated action has been removed.

EPA and CDPHE agree that based upon the application of the risk screen methodology, no accelerated action is required for subsurface contamination in T-7, the Ash pits and the soils wrapped in geotextile that were returned to T-4 as part of the T-3/T-4 accelerated action. Thus, the budget resources for these three IHSSs will allow for additional characterization and soil removal.

In response to comments, the RFCA Parties will add new OPWL characterization targeted sampling points and the depth of targeted samples will increase to 8 feet. This is in conjunction with completed or planned sampling for Under Building Contamination (UBC) and information gathered from the planned removal of valve vaults and OPWL. The limited amount of OPWL removed to date, including from the 700 Area, has not been highly contaminated or contributed to soil contamination. UBC characterization data collected to date indicates a lack of contamination from OPWL under deeper buildings. This sampling will provide additional confidence regarding the adequacy of characterization for areas of reported or suspected OPWL leaks.

In addition, the change to remove soils to below 1 nCi/g between 3 and 6 feet below the surface once an accelerated action is triggered eliminates the need for a community consultative process when an accelerated action is under way. This should streamline the

RFCA Party field consultation and allow the conduct and completion of these actions based on real time evaluations of remaining contamination without delays that might result from a community consultation process. The RFCA Parties believe that this change will result more contaminated soil removal at the ongoing 903 Pad soil removal action. If contamination between 1 and 3 nCi/g is found at multiple sampling points for any IHSS or group of IHSSs in close proximity, the DOE and LRA will evaluate the potential for risk of exposure and consult with the community regarding the need for further action.

Section 5.3.K now also specifies that if the Subsurface Soil Risk Screen evaluation results in the determination that no accelerated action is triggered, the evaluation and results will be documented and approved by the Lead Regulatory Agency as a No Further Accelerated Action.

3.2 Attachment 10, RCRA Closure for Interim Status Units – The proposal contained a new Part IV to allow for risk-based closure of certain RCRA/CHWA units in accordance with the integrated risk-based approach. This incorporated a regulatory change that was promulgated subsequent to the development of this Attachment in 1996. Part III recognizes the CDPHE determination that OPWLs are not interim status units.

Several comments were received regarding certain implementation aspects of the approach and the status of OPWLs and other units subject to this Attachment. New language was added to the final modification to clarify the basis for the determination for OPWLs. A few minor edits were also made. Since the implementation aspects will be the subject to subsequent decision documents and the regulatory change is applicable to the Site, the Attachment was otherwise finalized as proposed.

3.3 New Attachment 14, Original Process Waste Lines Subsurface Soil Approach - It is expected that the most likely source of possible plutonium-239/240 contamination originating in the 3 to 6 foot depth interval is from reported or suspected OPWL leaks.

Comments received were similar to those related to Attachment 5, Section 5.0. In summary, most commenters asked that contaminated soil below three feet be removed to 1 nCi/g or less when an accelerated action is triggered. They also asked that characterization should not stop at six feet and that more OPWL sampling locations be considered. Some commenters expressed concern about the sampling methodology, including how the proposal's "upper limit" of 10nCi/g would be implemented. In considering these comments along with those related to Attachment 5, Section 5.0, the RFCA Parties have made a number of changes to this Attachment consistent with the final changes made to Section 5.0.

First, the sample depth for targeted sample locations has been changed from six to eight feet to provide information about the vertical extent of contamination that may originate from an OPWL leak in the three to six foot depth interval. This characterization information will be used in the risk screen evaluation to make accelerated action

determinations for soil removal below six feet that may have originated from OPWL leaks in the 3-6 foot depth interval.

Second, the following table of the step out sampling points based upon the plutonium-239/240 concentration found at the initial targeted sample location has been added.

Contamination Level (nCi/g)	Areal Extent Limit (m^2)	Volume Extent Limit (m^3)	Step-out Sample Locations
7	0	0	None
6	40	25	2m x 5m
5	50	31	2m x 6m
4	60	37	2m x 7.5m
3	80	50	2m x 10m

The table shows that the spacing of the step out sample points is a function of the initial sample concentration. As the initial sample concentration increases the area circumscribed by the step out points decreases in increments. The sampled area and volume of soil based on the proposal's accelerated action trigger of 3 nCi/g, at 80 m^2. This represents an approximate sampled volume of 50 m^2 because each soil sample is the column of soil between three and eight feet below the surface divided into approximately 2-foot increments for laboratory analysis.

Third, as shown in the table, if the initial targeted sample is 7nCi/g or greater, an accelerated action is triggered. This was lowered from 10nCi/g in the proposal.

Fourth, as discussed in Section 3.1.5 related to ALF Section 5.0, the RFCA Parties evaluated the completed and planned sampling and analysis points for UBC and OPWL associated IHSSs. Based on this evaluation, additional OPWL targeted sampling locations will be included, which will result in thorough characterization of the OPWL. The proposal's targeted location descriptions were included as appendices to this Attachment. These appendices have been removed from the final Attachment 14. Instead, these locations will be specified in the modification of the Industrial Area Sampling and Analysis Plan necessitated by a number of provisions in the final modifications.

ENCLOSURE

ANNOTATED RFCA ATTACHMENT 5 TABLE 1, SURFACE WATER ACTION LEVELS AND STANDARDS